

Gateway Energy & Coke Company, LLC

PREVENTIVE MAINTENANCE AND OPERATION PLAN (PMO Plan) October 2016

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

List of Acronyms

API	American Petroleum Institute
CPV	Critical Process Variable
EAM	Enterprise Asset Management
FGD	Flue Gas Desulphurization
GECC	Gateway Energy and Coke Company
GECC Air Permit	Permit and its subsequent revisions
HMI	Human Machine Interface
HRSG	Heat Recovery Steam Generator
MOC	Management of Change
MWP	Maintenance Work Process
NBIC	National Board Inspection Code
NESHAP	National Emission Standards for Hazardous Air Pollutants
NTE	Not-to-Exceed
OEM	Original Equipment Manufacturer
IEPA	Illinois Environmental Protection Agency
PAC	Powder Activated Carbon
PCM	Pushing/Charging Machine
PLC	Program Logic Control
PM	Preventive Maintenance
PMC	Production Maintenance Coordinator
PMO Plan	Preventive Maintenance and Operation Plan
RCFA	Root Cause Failure Analysis
SOP	Standard Operating Procedure
SSM Plan	Startup, Shutdown, and Malfunction Plan
USEPA	United States Environmental Protection Agency

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

Table of Contents

INTRODUCTION	4
I. PURPOSE OF THE PMO PLAN	5
II. DEFINITIONS.....	7
III. STARTUP OPERATING PROCEDURES	9
IV. SHUTDOWN OPERATING PROCEDURES.....	10
V. MALFUNCTIONS	12
VI. RECORDKEEPING AND REPORTING	13
VII. PREVENTIVE MAINTENANCE.....	14
VIII. OPERATIONAL CONTROL.....	15
IX. ROOT CAUSE FAILURE ANALYSIS.....	17
X. MANAGEMENT OF CHANGE	19
XI. RELIABILITY STUDIES AND CRITICAL SPARE PARTS MANAGEMENT	20
XII. OUTAGE PLANNING AND EXECUTION	22
XIII. ROLES AND RESPONSIBILITIES	25
XIV. PMO PLAN MODIFICATIONS OR REVISIONS	26

List of Attachments

ATTACHMENT A – STARTUP, SHUTDOWN, MALFUNCTION PLAN.....	27
ATTACHMENT B – EXAMPLE OF ENVIROMENTAL CRITICAL PM	48
ATTACHMENT C – PM WORKFLOW PROCESS.....	51
ATTACHMENT D – PM EXTENSION FORM.....	52
ATTACHMENT E – ENVIRONMENTAL: MANAGEMENT OF CHANGE	53
ATTACHMENT F – RELIABILITY STUDIES PROJECT LIST	54
ATTACHMENT G – OUTAGE WORK SCOPE ADDITION APPROVAL	58
ATTACHMENT H – PMO PLAN DOCUMENT CONTROL FORM	59
ATTACHMENT I – COPY OF CONSENT DECREE PARAGRAPH 17.....	60

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

INTRODUCTION

This document serves as the Preventive Maintenance and Operation Plan (“PMO Plan”) for the Gateway Energy & Coke Company (“GECC”), which has been prepared to ensure compliance with the National Emissions Standards for Hazardous Air Pollutants (NESHAP) Startup, Shutdown, and Malfunction Plan (SSM Plan) provisions of 40 CFR §63.6 (e)(3) and with Construction Permit 06070020 and its subsequent revisions (“GECC Air Permit”). The MACT Subpart CCCCC required Operations and Maintenance Plan and Site Specific Monitoring Plan are separately maintained.

The PMO Plan has been developed pursuant to a Consent Decree with the United States, the State of Illinois, and the State of Ohio, which was entered by the United States District Court for the Southern District of Illinois with an Effective Date of November 7, 2014 (Consent Decree).

All employees and contractors of GECC shall follow the guidelines detailed in this plan.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

I. PURPOSE OF THE PMO PLAN

GECC's PMO Plan shall have the goal of minimizing and/or eliminating Bypass Venting to ensure compliance with limits and requirements established by Paragraph 17 of the Consent Decree, which is attached as Attachment I. The purposes of GECC's PMO plan are to:

1. Set forth a plan to implement enhanced maintenance and operation of GECC's coke oven batteries, Heat Recovery Steam Generators (HRSGs), Flue Gas Desulfurization system (FGD), and other pollution control equipment.
2. Provide that, at all times, GECC operates and maintains its control systems, affected sources, and monitoring equipment in a manner consistent with safety and with good air pollution control practices and minimization of emissions as required by the Consent Decree and the GECC Air Permit.
3. Provide procedures for maintenance and operation whose intent is to minimize and/or eliminate emissions from bypass venting to ensure compliance with applicable emission limits.
4. Set forth procedures that shall provide for continuous operation of GECC's HRSGs and FGD between scheduled maintenance with minimization of emissions, including emissions minimizations plans, emergency procedures, and schedules to coordinate Scheduled FGD Maintenance and Scheduled HRSG Maintenance where practicable.
5. Set forth a process for coordinating GECC's Scheduled HRSG Maintenance and Scheduled FGD Maintenance events to minimize emissions.
6. Set forth procedures to minimize GECC's Bypass Venting events (both planned and unplanned/emergency situations) and to minimize emissions during these events in accordance with the Consent Decree and the GECC Air Permit.
7. Ensure that GECC is prepared to evaluate and control malfunctions as soon as practicable after their occurrence in order to minimize emissions.

GECC shall comply with the PMO Plan at all times, including periods of Startup, Shutdown and Malfunction of the HRSGs and FGD.

The PMO Plan references startup, shutdown and malfunction, or emergency procedures for the affected production processes and associated emission points. These procedures should be followed at all times when startup, shutdown, and malfunction events occur. The PMO plan also includes FGD/HRSG Reliability Studies ("Reliability Studies") which will (1) comprehensively catalog and describe all projects implemented in the past to improve the reliability of the operation of the existing FGD and existing HRSGs at the Affected Coke Oven Batteries, and (2) discuss or propose potential future reliability enhancements.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

The SSM Plan, which is a separately maintained plan, also describes GECC's corrective action procedures for malfunctioning emissions control device components, process equipment, and monitoring equipment that is used to comply with GECC's Air Permit requirements. A list of GECC's processes, emissions points, and emissions control arrangements is found in the SSM Plan, Table 1, Description of Process Equipment and Emissions Controls. The SSM Plan is included as Attachment A for reference.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

II. DEFINITIONS

a) Definitions set forth in 40 C.F.R. §63.2:

1. Startup: *"the setting in operation of an affected source or portion of an affected source for any purpose."*
2. Shutdown: *"the cessation of operation of an affected source or portion of an affected source for any purpose."*
3. Malfunction: *"any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions."*

b) Definitions used in this PMO Plan that are specific to individual steps of coke production:

1. Affected Coke Oven Battery: all heat-recovery ovens in which coal undergoes destructive distillation to produce coke at GECC.
2. Bypass Venting: the redirection of a gas stream at an Affected Coke Oven Battery through the Bypass Vent Stacks directly to the atmosphere (thereby bypassing the HRSGs and FGD).
3. Bypass Venting Incident: bypass venting that lasts longer than thirty (30) cumulative minutes for all stacks at an Affected Coke Oven Battery over a twenty-four (24) hour period [this definition is used only for purposes of determining whether a Root Cause Failure Analysis (RCFA) is required].
4. Bypass Vent Stack: each vent stack located between the coke oven battery common tunnel and each HRSG.
5. Coking (in heat-recovery coke ovens): the process where coal undergoes destructive distillation under negative pressure to produce coke. The process usually consists of sequential pushing and charging of groups of ovens within the batteries, with a typical coking time of 48 hours.
6. Coking Time: the time interval that starts when a coke oven is charged with coal and ends when a coke oven is pushed.
7. Excess Emissions: an emissions rate exceeding the standards as established in 40 CFR 63 Subpart L, 40 CFR 63 Subpart CCCCC, the Consent Decree, and/or the GECC Air Permit.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

8. Startup of pushing/charging: commencing operation of a coke battery's pushing/charging machine (PCM), consisting of the sequential process of removing the coke from the oven and charging coal into the oven. The push/charge cycle starts when the coke oven door is removed. Pushing of an oven begins with the first detectable movement of the coke mass and ends when the quench car enters the quench tower. Charging of an oven begins with the insertion of the charging conveyor into the oven and ends with securing the pushing side door of the oven with two to four latches.
9. Shutdown of pushing/charging: the termination of operations such that the last scheduled oven of a pushing/charging cycle has been emptied of coke, charged with coal and the pushing side door of the oven has been secured with two to four latches.

c) Definitions used in this PMO Plan to describe GECC's systems and processes

1. Enterprise Asset Management System (EAM): a computerized asset maintenance system that provides asset management, work management, materials management, and purchasing capabilities to help GECC maximize productivity and extend the life of its assets. GECC currently uses IBM MAXIMO ("MAXIMO") as the EAM.
2. Maintenance Work Process (MWP) – the process used at GECC to efficiently execute maintenance activities on process equipment and facilities.

III. STARTUP OPERATING PROCEDURES

GECC's heat-recovery coke oven battery is designed to operate continuously under negative pressure. Negative pressure (i.e. draft) is maintained in the batteries using GECC's induced draft (ID) fans or alternatively via natural convection from a battery's Bypass Vents Stack(s) during bypass venting. Coke production operations consist of sequences of discrete steps such as coal transfer to coke ovens, pushing of coke out of ovens, charging of coal into the ovens and coke transfer.

a) Startup of pushing/charging operations in the coke production sequence:

Startups will be conducted such that emissions are minimized during these events. Pushing and charging startups will be performed according to the applicable GECC Standard Operating Procedure(s) (SOPs). The following process steps are followed during the pushing/charging start-up process:

1. Inspect ovens scheduled for pushing/charging in the current cycle to confirm their readiness to be pushed. Oven must not be pushed unless the visual inspection by the Product Technician or Machine Operator confirms that there is no smoke in the open space above the coke bed and there is an unobstructed view of the door on the opposite side of the oven, in accordance with 40 CFR 63.7293.
2. Start the PCM baghouse fan and check the baghouse differential pressure to ensure that it is within the range required by the Permit. Ensure proper operation prior to beginning pushing ovens.
3. Start the flat push hot car multiclone and check its differential pressure and fan amperage. Ensure proper operation prior to beginning pushing of ovens.
4. Start the coke screening station baghouse and check the differential pressure. Ensure proper operation prior to beginning pushing of ovens.
5. Set-up the PCM on the first oven of the sequence and start the pushing/charging cycle.

If the differential pressure and fan amps (where applicable) are not within their prescribed operating ranges, then the start-up and/or machinery operation shall be suspended until the problem is diagnosed. Where practicable, pushing or charging operations will be suspended until the baghouse returns to normal operating conditions.

IV. SHUTDOWN OPERATING PROCEDURES

Heat-recovery coke oven batteries are unique from other industrial processes in that once the ovens are started during the initial heat-up sequence they cannot be shut down. A heat recovery oven battery cannot be shut down for two primary reasons. First, the shutdown of a battery would result in the cooling of its silica brick to temperatures below 1200°F, which could cause thermal spalling. Secondly, during the operation of a battery its ovens expand due to thermal growth of single brick elements. The shutdown of a battery would cause the bricks to contract to their unheated size, which could induce structural failure. Shutting down ovens to a cold state in order to minimize emissions is not a technically feasible option due to the catastrophic structural damage they would incur.

a) Shutdown of pushing/charging operations of coke production sequence

After the last oven in the cycle has been charged and the door is reinstalled, shutdown of the PCM will occur. The affected PCM baghouse will be kept online and operated within the prescribed differential pressure range in the Permit until the charging side door of the last oven scheduled in the cycle has been reinstalled and secured with the latching mechanism. After this condition is satisfied, the PCM will be shut down.

b) Planned or scheduled GECC maintenance outage

GECC does not typically conduct facility-wide shutdown events; it conducts scheduled shutdown events for specific process units and control devices (e.g., HRSG units, FGD system). These shutdown events include, but are not limited to, HRSG and FGD shutdowns to perform maintenance. GECC's shutdown events shall be coordinated in a manner that will minimize emissions. In regards to HRSG and FGD maintenance, "planned" or "scheduled" shall mean the following:

- **Planned or Scheduled FGD Maintenance:** preventative maintenance, inspection and repair of FGD components that is planned for and scheduled at least 21 days prior to commencement of such activity. If forty-eight (48) hours' notice is provided prior to beginning FGD maintenance work, that work is considered planned or scheduled FGD maintenance if the work was originally scheduled no less than 21 days prior to beginning the work.
- **Planned or Scheduled HRSG Maintenance:** preventative maintenance, inspection and repair of HRSG components that is planned for and scheduled at least 7 days prior to commencement of such activity. If forty-eight (48) hours' notice is provided prior to beginning HRSG maintenance work, that work is considered planned or scheduled HRSG maintenance if the work was originally scheduled no less than 7 days prior to beginning the work.

All planned or scheduled FGD and HRSG maintenance, as well as other maintenance activities in which there is greater than forty-eight (48) hours' notice prior to the beginning of the

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

scheduled maintenance (collectively “scheduled maintenance”) shall be conducted in accordance with the following procedures:

1. Plant outages will be coordinated, communicated and planned in a timely manner. To the extent practicable, HRSG maintenance outages shall be scheduled during Scheduled FGD maintenance periods.
2. The critical path of maintenance will be determined to reduce the duration of an outage.
3. Implement the following procedures for reducing the coal charge weights of ovens affected by Bypass Venting (i.e. the ovens that vent to the bypass vent stack(s) during an outage) and for using coal with no more than 1.1% sulfur by weight if practicable during bypass venting. The following procedures will be utilized to reduce coal charge weights for scheduled maintenance:
 - a. If practicable, GECC will (beginning forty-eight (48) hours prior to the beginning of the scheduled maintenance (i.e. the opening of the stack lid(s)), and if that is not practicable, as soon as the Facility can do so) reduce the coal charged to the affected ovens to no more than a 42.5 ton average on a wet weight basis.
 - b. GECC may begin increasing the charge weights to the ovens after the stack lid(s) have been closed.

c) Unscheduled maintenance outage

In the event of an unscheduled maintenance outage that is anticipated to be greater than 24 hours in duration, the following procedures will be utilized to reduce coal charge weights if practicable:

1. As soon as GECC becomes aware that an unscheduled maintenance outage will last more than 24 hours, GECC will, with the first charge on the group of affected ovens (i.e. the ovens that vent to the applicable bypass vent stack), reduce coal charges to these ovens by two tons per oven per charge cycle, until either the bypass venting has concluded or an average charge weight of 42.5 tons per oven across the affected ovens has been reached.
2. GECC may begin increasing the charge weights to the ovens after the stack lid(s) have been closed.

V. MALFUNCTIONS

Malfunctions are defined in Section II of this PMO Plan. During a malfunction event, the following general response steps will be performed.¹

1. Malfunction identification - Potential causes of malfunctions and the corresponding response procedures that should be performed are outlined in the attached SSM Plan.
2. Notification – When a malfunction occurs, the appropriate supervisory personnel who are present at the facility at the time of the event (e.g. General Manager, Environmental Manager, Operations Manager, Maintenance Manager, etc.) will be notified immediately. These individuals will provide assistance and guidance as necessary to successfully perform the response actions and notify the Environmental Manager if he/she is not present at the facility.
3. Diagnosis and malfunction cause determination - Malfunctions will be analyzed in order to determine the appropriate corrective actions. GECC will perform a Root Cause Failure Analysis (RCFA) for all malfunction events that qualify as a Bypass Venting Incident, which is defined as all Bypass Venting that lasts longer than thirty (30) cumulative minutes for all stacks at an Affected Coke Oven Battery over a twenty-four hour period. The RCFA shall contain the information set forth in Section IX of this PMO Plan.
4. Corrective action procedures – After the cause(s) of the malfunction has been determined, any appropriate corrective action(s) will be implemented to resolve the malfunction, restore the affected process equipment back to normal operation, and reduce the likelihood of the malfunction's recurrence. Potential corrective action measures are listed in the attached SSM Plan.
5. Reporting – GECC will report the malfunction to the IEPA in accordance with the GECC Air Permit.

¹ Please note that some of these steps may be completed out of the order listed, as appropriate.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

VI. RECORDKEEPING AND REPORTING

In accordance with GECC's Air Permit, 40 CFR §63.10(d)(5)(i), 40 CFR §63.311(d)(2), and 40 CFR §63.7341(c)(4.), GECC will maintain and make available for inspection the applicable records, logs, reports, and/or notifications as required. GECC's recordkeeping and reporting obligations pertaining to regulatory requirements, except for the Consent Decree, are maintained in other GECC plans and/or permits associated with the applicable regulation.

In addition, GECC will submit semiannual progress reports to the USEPA and IEPA pursuant to the Consent Decree. These reports will include a copy of any updates to this PMO Plan, if applicable.

VII. PREVENTIVE MAINTENANCE

Preventive Maintenance (PM) is the performance of maintenance tasks that either; 1) repair or service emission units in accordance with good engineering and air pollution control practices, 2) extend the life of an asset, or 3) detect a potential for unplanned failure. PM is managed within the EAM system. A PM record is a plan to perform periodic work on an asset, or a group of assets. PM records include the asset number, the frequency in which a particular task is performed, and the next due date when the task is to be performed. The EAM system automatically generates PM Work Orders at a predetermined time interval to provide a method in which to execute the work in the field. PM tasks can be categorized as safety or environmental critical, which carry a higher scheduling priority than other PMs within the MWP.

PMs include regularly scheduled inspection and maintenance that is designed to meet the objectives above. Examples of PMs that would detect a potential for unplanned failure include vibration testing on an induced draft fan or nondestructive thickness testing of HRSG tubes. Examples of PMs that would repair or service equipment includes periodic inspection and change out of baghouse filter cartridges or bags or routine inspection and cleaning of vent stack pressure sensors.

All PMs are housed in the EAM system as described here. PM records contain all relevant information for conducting the PM and ensuring that the objectives above are met. This may include, but is not limited to, a job plan, the name of the person or group is assigned to execute the task, the required frequency for conducting the PM, a list of specific tasks that must be performed, a list of specific parameters that must be met, a list of equipment or tools necessary to conduct the PM, requirements for data collection or observations, and/or the location of the equipment to be serviced. PMs are updated as equipment or needs change or additional PMs are identified. A list of all PMs is not included here as it resides in the EAM system where it is kept current and up to date. An example list of environmental critical PMs is included as Attachment B, Example of Environmental Critical PMs. The current and up-to-date list of PMs is maintained in the EAM system and this PMO Plan will not be updated to reflect changes to the Environmental Critical PM list.

At a minimum, a completed PM record must contain the statement of work (job plan), the name of the person or group who executed the PM task, and the date the PM was performed. Results of PM inspections are reviewed for technical content and potential follow-up actions by the Maintenance Supervisor. Paper copies of the completed environmental critical PM work orders are routed to the plant Environmental Manager for review. The work order closure process flow is included as Attachment C, PM Workflow Process.

When technical justifications exist, an individual PM due date can be extended by following a documented deferral process. This action can only be taken prior to the PM due date after proper reviews and approval. A PM due date extension is approved by the Maintenance Manager and Reliability Engineer. For Safety or Environmental Critical PM's additional approvals are required by the GECC Safety or Environmental Manager, as applicable, and the General Manager. The PM deferral form is included as Attachment D, PM Extension Form.

VIII. OPERATIONAL CONTROL

Processes and equipment at GECC will be monitored by establishing the optimum, normal, and safe operating ranges of performance. Personnel will utilize reading sheets, control systems, and operating procedures to monitor and maintain these ranges. Select process components will be designated critical to the safety and reliability of the process, personnel, and environment. By maintaining Operational Control, GECC demonstrates its commitment to personnel safety, environmental stewardship, and asset reliability.

Critical Process Variables (CPV) are variables, standards, targets or ranges that are used to control processes to minimize the possibility of personnel injury, an uncontrolled release, a permit non-compliance, significant equipment damage, or loss of production. The purpose of a CPV is to identify the range of operation (such as temperature, pressure drop, amperage, etc.) over which a piece of equipment or a process operates safely and efficiently. Normal operating limits define the typical upper and lower range for process variables during stable operations. Not-to-Exceed (NTE) limits are used to help define safe upper and lower limits of operation, the point at which troubleshooting ends, and a prescribed set of actions to mitigate a potential issue.

GECC maintains a list of CPVs. This list includes the following information for each CPV:

- CPV description
- Consequence of deviation
- Associated NTE limit
- Process troubleshooting guide
- Prescribed action for surpassing a NTE

CPVs are reviewed by responsible departments as necessary to ensure that they are current and meet minimum requirements. If changes are made that may require updating CPV's, that evaluation will be made through the Management of Change process in Section X. GECC's Operational Control performance is reviewed by the site leadership team as necessary.

The following table is an example of some CPVs established for GECC. Please note, this table is for example purposes only. CPV information is continually being updated and revised based on operating experience and the most up-to-date version is available in GECC's electronic files. The current list of CPVs is available for inspection on-site upon request.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

Example Critical Process Variables (CPVs)²

EQUIPMENT	CPV PARAMETER	Normal Range	Not to Exceed
HRSGs	HRSG Drum Pressure	1275 – 1375 psig	Min. 1000 psig Max. 1500 psig
HRSGs	HRSG Drum Level	-1 to +1 inches	Min. -15” Max. +8”
FGD System	Atomizer Bearing Temperature	145 – 165°F	Min. 120°F Max. 210°F
FGD System	Cooling Water Temperature	70 - 72°F	Min. 60°F Max. 85°F
FGD System	Fabric Filter Differential Pressure	6 - 9" H ₂ O	Min. 3" H ₂ O Max. 15" H ₂ O
FGD System	SDA Outlet Temperature	240 - 250°F	Min. 230°F Max. 370°F
Induced Draft Fan	ID Fan Vibration	0.4 – 0.8	Min. 0 Max. 7.0

² This table is for example purposes only. CPV information is continually being updated and revised based on operating experience and the most up-to-date version is available in GECC's electronic files. The current list of CPVs is available for inspection on-site upon request.

IX. ROOT CAUSE FAILURE ANALYSIS

GECC utilizes RCFA techniques to investigate Bypass Venting Incidents. The RCFA process helps address issues by identifying and implementing corrective actions for the root causes of events. By focusing on the root causes, the likelihood of recurrence can be reduced.

The primary aim of an RCFA is to identify the contributory (causal) factors that resulted in the nature, magnitude, and location of one or more past Bypass Venting Incidents. By establishing causal factors, GECC can identify potential actions, inactions, and/or conditions that may be modified to reduce the likelihood of recurrence of similar outcomes. In addition, the RCFA process is used to identify the lessons to be learned to promote continuous improvement. A team-based approach towards conducting an RCFA may be utilized and the investigation will endeavor to understand the relationships between potential root cause(s) and the issue to minimize the likelihood of recurrence.

GECC utilizes two types of RCFA methodologies, Events and Causal Factor Analysis³ and Five Whys Analysis⁴. Triggers have been established to provide guidance to the site's General Manager in determining which methodology will be used based on a Bypass Venting Incident's consequences. An RCFA will be conducted for every Bypass Venting Incident and shall contain the information outlined below.

For Bypass Venting Incidents that are a result of Scheduled HRSG Maintenance, Scheduled FGD Maintenance or HRSG Tie-in Time, the following information will be included in the RCFA report:

- a) The date and time the Bypass Venting Incident started and ended.
- b) An estimate of the quantity of SO₂, PM, and Lead emissions that were emitted and the calculations that were used to determine that quantity.
- c) Identification of the emissions minimization steps taken and not taken pursuant to Section IV of this document, along with (1) an explanation of why any steps were not taken, (2) an estimate of the sulfur content of the coal charged into each coke oven whose emissions are bypassed, and (3) an estimate of the corresponding charge weights associated with each such oven.
- d) The cause of the Bypass Venting Incident.

For Bypass Venting Incidents that are not a result of Scheduled HRSG Maintenance, Scheduled FGD Maintenance or HRSG Tie-in Time, the following information will be included in the RCFA report:

- a) The date and time the Bypass Venting Incident started and ended.
- b) An estimate of the quantity of SO₂, PM, and Lead emissions that were emitted and the calculations that were used to determine that quantity.
- c) Identification of the emissions minimization steps taken and not taken pursuant to Section IV of this document, along with (1) an explanation of why any steps were not taken, (2) an estimate of the sulfur content of the coal charged into each coke oven whose emissions are bypassed, and (3) an estimate of the corresponding charge weights associated with each such oven.
- d) The cause of the Bypass Venting Incident.

³ GECC uses Sologic, formerly Apollo Associated Services leading RCA software in the process industries for over 20 years.

⁴ GECC uses a traditional 5 Whys analysis which is embedded in the EAM system.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

- e) A detailed analysis that sets forth the root cause(s) and all contributing causes of the Bypass Venting Incident, to the extent determinable, and the steps, if any, that were taken to limit the duration and/or quantity of emissions associated with the Bypass Venting Incident.
- f) An analysis of the measures, if any, that are reasonably available to prevent or reduce the likelihood of a recurrence of the Bypass Venting Incident resulting at the same Affected Coke Oven Battery from the same root cause(s) and contributing causes in the future. The analysis shall evaluate design, operational, and maintenance changes, if any; the probable effectiveness of each measure; the likely cost of each measure; and whether or not an outside consultant should be retained to assist in the analysis.
- g) Either a description of corrective action(s) implemented or, if not already implemented, a schedule for its (their) implementation, including proposed commencement and completion dates, or an explanation that the corrective action(s) is (are) not required.

Action items from RCFAs are assigned to individuals to complete and are tracked. The status of action items is periodically reviewed by GECC's leadership team.

X. MANAGEMENT OF CHANGE

At times, certain changes to GECC assets or operational practices that involve significant changes to process, mechanical, civil, electrical or technological specifications are managed using the EAM system Management of Change (MOC) process.

The originator of a MOC must provide the technical basis for the change (provide the scope) which includes the description of why a change is being proposed and what improvements or benefits are expected (provide the justification). This information is required for all MOCs and is provided during the origination phase of a MOC record.

The MOC system coordinator assigns one or more subject matter experts to review the change. The review team will include the site Environmental Manager whenever a process change is being proposed that involves environmental media or a process with environmental implications. A predefined list of environmental consequences may be utilized during the review and is included as Attachment E, Environmental: Management of Change. The change will also be subjected to technical analysis for adherence to good engineering design standards and to ensure the proposed design is safe, reliable, cost-effective and environmentally sound. MOC reviewers can assign follow up actions that must be completed prior to implementation of the change. All subject matter experts or their designees must review and approve any changes prior to implementation.

XI. RELIABILITY STUDIES AND CRITICAL SPARE PARTS MANAGEMENT

a) FGD/HRSG Reliability Studies

FGD/HRSG reliability studies have been prepared that comprehensively catalog and describe the projects implemented or to be implemented to improve the reliability of the operation of the existing FGD and HRSGs.

These include, but are not limited to:

- A. Addition of instrumentation at atomizer gas inlets to monitor balance;
- B. Selective use of atomizers for reduced load conditions;
- C. Addition of dew-point analyzers;
- D. Testing and implementation of spray dryer absorber thermocouple chain;
- E. Increasing the number of spare atomizers for additional maintenance redundancy.

A list of GECC's Reliability Study Projects is included in Attachment F, Reliability Study Project List.

b) Critical Spare Parts Management

An equipment criticality review is performed by a multi-disciplined team when substantial new equipment additions occur. The purpose of the analysis is to assign a consequence in the event of an equipment failure. The criticality rating system used assigns criticality values in the following areas:

- Environmental
- Production
- Cost

The criticality rating system is used in determining the asset management strategy for the equipment including:

- Optimal spare part stocking levels
- Preventive maintenance tasks and frequency
- Predictive maintenance tasks and frequency
- Work order scheduling prioritization

The Production Maintenance Coordinator (PMC) is responsible for ensuring work orders are properly entered into the EAM before they are released to the maintenance department. Job planning and actual hours/cost are generally documented on each work order record. This information becomes a permanent part of the equipment record and is available for review and analysis.

Ensuring that the proper levels of spare parts are available is a complex and time consuming activity which requires an ongoing continuous improvement process. GECC has thousands of pieces of equipment which includes tens of thousands of sub components resulting in hundreds of thousands of

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

parts. A technical analysis must be performed on each piece of process equipment. The equipment criticality ranking is an important tool for prioritizing this work effort.

Additions, deletions and changes to the spare part inventory are controlled to ensure the proper technical descriptions and quantities are maintained for reliable operations. A documented process is followed which requires approval by the inventory supervisor, maintenance manager and plant controller.

Spare parts are managed within the EAM system which utilizes an automated reordering process that ensures rapid critical spare part replenishment. Inventory management tracks and reports:

1. Reorders are performed regularly
2. Quantity of inventory purchase requisitions not released
3. Quantity of overdue inventory items
4. Inventory cycle count accuracy

XII. OUTAGE PLANNING AND EXECUTION

GECC maintains an annual GECC outage schedule that coordinates scheduled HRSG maintenance, where practicable, with scheduled FGD maintenance to minimize emissions. The schedule shall include time to execute stack testing concurrently with Scheduled FGD Maintenance that lasts longer than two days. This schedule will also coordinate outage events between sites to optimize the use of shared resources and equipment for effective outage execution and to minimize outage durations. The initial fleet outage schedule will be developed and distributed for the current outage year. Due to the interrelationship of individual outage events and the complexity of the planning process, changes to the initial outage schedule may occur. A process is in place to review any request for schedule changes that could impact outage efficiency and duration.

An inspection program is in place that conforms to American Petroleum Institute (API), National Board Inspection Code (NBIC), and Original Equipment Manufacturer (OEM) requirements to provide proactive inspections of HRSG and FGD equipment, and which monitors equipment condition. Whenever possible, and in particular pre-redundancy, proactive equipment repairs (i.e. boiler tube replacement) will be planned and executed during scheduled HRSG and FGD outages to minimize unscheduled outages and emission events.

GECC utilizes a structured outage management process to the extent practicable, which follows industry and internal best practices. The key points of the process, which address the minimization of outage duration and resulting emissions, are outlined below:

Outage Identification Phase

- Definition of overall outage objectives

The purpose of taking the outage is examined and options to defer are evaluated. The possibilities of combining the outage with other future planned events (i.e. capital project) are evaluated.

- Charter outage management team

The key individuals who will be assigned to manage the outage are determined so that their direct supervision is aware of the time commitment required to successfully plan and manage the outage event. An organization change management process is followed to ensure other critical tasks normally managed by these individuals are properly resourced.

- Provide a high level cost and duration estimate

A high level cost and duration estimate is provided for annual fiscal budgeting purposes. Sufficient funds are secured in the budget to complete the work scope necessary to provide safe and reliable operation after the outage.

- Identify any potential long lead time items

An attempt is made to identify any material items that may have exceptionally long lead times (i.e. alloy boiler tubes) so that orders can be placed in advance and not affect the outage schedule.

Outage Definition Phase

- Detailed work scope development

A call to all functional groups is made to begin the process of entering work requests into the EAM for all outage work. Existing work backlog and inspection results are reviewed to determine that all work, which may have an impact on the ultimate outage duration, is identified well in advance.

- Need for specialized contractors identified

The availability of certain specialized contractors can sometimes impact work execution start dates. At this time specialty contractors are contacted concerning their availability.

- Visual schedule developed

As planning estimates are performed on work orders in the EAM system, they are moved to a visual schedule format so that the interrelationships between jobs and peak manpower resource requirements can begin to be examined.

- Work scope freeze date defined

Scheduled outage work will be identified no later than ninety (90) days prior to the outage start date so that work can be effectively planned and schedule optimization techniques applied to minimize overall duration. A documented process is in place to approve any work added to the outage scope < 90 days prior to the start date so that the impact of the work scope expansion can be fully accessed as it relates to outage duration. Any work scope addition that has the potential to extend the overall outage duration is reviewed by the plant Environmental Manager (See Attachment G, Outage Work Scope Addition Approval).

- Integration of operation shutdown / startup plan into schedule

The time and resources required for the operating department to safely shutdown / startup and prepare the unit for maintenance is integrated into the visual schedule. This will define the true “maintenance window” for the outage.

- Integration of capital work into schedule

The time and resources required for any potential capital work that will be performed during the outage is integrated into the outage schedule.

- Bid packages sent to contractors

Bid packages are sent to outside contractors for formal quotations and estimated schedule.

Planning & Scheduling and Execution Phase

- Confirmation of material deliveries

Material and supply purchase order delivery dates are closely monitored and expedited when required to avoid the potential of an outage schedule delay.

- Outage communication boards developed

Regular updates are provided to all GECC and resident contractor employees on the scope and planned duration of the outage. Total employee involvement is required for a successful outage.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

- Schedule “critical path” analysis

Once the maintenance, operation and capital work scope is contained in the visual schedule, structured reviews are conducted to minimize the outage critical path. All possible avenues (i.e. changes to maintenance work schedules, use of improved technologies, etc.) are considered to minimize outage duration.

- Award contracts to successful bidders

Contracts to third party contractors are awarded well in advance of the outage to secure the resources and manpower required to execute the outage within schedule. It is a requirement of contractors to perform an on-site job walk down prior to the outage start date to identify any items that could lead to a schedule delay.

- Work permitting plan finalized

During outages, more safe work permits are issued than during normal plant operation. A plan is developed to ensure that the proper resources are available to approve and issue safe work permits to avoid shift start delays.

Closure Phase

- Job history is documented in EAM system

The labor hours and materials used to execute each job completed during the outage are documented on the individual work order record. On more complex jobs, history comments are added to the record. This information is used to support reliability studies and continuous improvement efforts.

- Outage/Planning Review

The final task of the outage manager is to facilitate a review of the outage event.

XIII. ROLES AND RESPONSIBILITIES

General Manager – Overall responsibility of the PMO Plan. Ensures that trained and qualified persons are assigned as the process owners of the MOC and RCFA work processes at the site. The General Manager shall ensure that the proper RCFA methodology is applied based on the consequence of the event. Conducts sequential review meetings to ensure preventive and corrective actions from MOC and RCFA processes are documented and managed to completion.

Operations Manager – Ensures that SSM procedures are readily available, understood and properly executed by all operations personnel. Responsible for providing or directing personnel to provide timely, initial communication of malfunction events. Ensures that CPVs are understood.

Maintenance Manager – Overall responsibility for the plant PM process, including ensuring that training is conducted on these PMO Plan requirements. Ensures that job plan tasks are sufficient to provide reliability and reduce the likelihood of malfunctions. Responsible for verifying PM completion, reporting PM compliance and developing action plans. Responsible for facilitating reliability studies and criticality analysis to ensure that critical spare parts are available for process equipment. Has overall responsibility for site outages and ensures that outage practices are understood and properly executed in the field. Ensures that an inspection program is in place that conforms to API, NBIC, and OEM requirements to provide proactive inspections of HRSG and FGD equipment, monitors equipment condition, and provides remaining life estimates.

Environmental Manager – Ensures that all events are reported in accordance with the GECC Air Permit, Consent Decree, and the requirements of 40 CFR 63.10(d)(5)(ii) and 40 CFR 63.7341(d). Maintains applicable records, logs, reports, and/or notifications pertaining to startup, shutdown, and malfunction events for at least 5 years following each occurrence or 3 years after termination of the Consent Decree, whichever is greater. Prepares periodic reports for startup, shutdown, and malfunction events to the USEPA and IEPA as part of the semi-annual compliance certifications required under Paragraph 48 of the Consent Decree and paragraphs 63.311(d) and 63.7341(c) of 40 CFR 63, Subpart L and Subpart CCCCC, respectively. Reviews the field documentation for all environmental critical PM tasks to ensure proper follow up actions are taken. Reviews and approves Environmental critical PM extension requests. Approves any outage work scope additions whose scope could increase the overall outage duration.

Production Maintenance Coordinator - Responsible for scheduling maintenance work, including PM tasks. Ensures that process equipment is available for scheduled PM and initiates PM extension requests, when required. Ensures work order quality (content and codification) is in compliance with GECC work process standards prior to release to maintenance.

Inventory Supervisor – Responsible for the overall management of the site spare parts inventory. Ensures that additions, deletions and changes to the spare part inventory are controlled to ensure the proper technical descriptions and quantities are maintained to ensure reliable operations. Executes the automated reordering process to ensure rapid parts replenishment and expedites overdue inventory items. Provides inventory management metrics and reports to site management.

XIV. PMO PLAN MODIFICATIONS OR REVISIONS

Modifications may be made to this PMO Plan as necessary to satisfy applicable requirements or to reflect changes in equipment or procedures. In accordance with Paragraph 37 of the Consent Decree, changes to this PMO Plan related to minimizing Bypass Venting and/or emissions shall be summarized and reported to EPA and IEPA. Such changes may be implemented immediately, but nonetheless shall be subject to the approval of EPA, after consultation with IEPA. Any changes to this PMO Plan will be included in the subsequent semi-annual periodic report. The PMO Plan revisions will be documented in Attachment H, PMO Plan Modifications or Revisions.

The SSM Plan is attached to this PMO Plan for reference, but is not required under the Consent Decree. Any changes to the SSM Plan, incorporated here as Attachment A, will be subject to the review and notification requirements of 40 CFR §63.6(e)(3)(viii) and will not be submitted for review as revisions to the PMO plan itself.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

ATTACHMENT A – STARTUP, SHUTDOWN, AND MALFUNCTION PLAN



SunCoke Energy™

Gateway Energy and Coke Company
2585 Edwardsville Road
Granite City, Illinois 62040

STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

CONTROLLED COPY

Issue Date: September 2009
Revision Date: October 7, 2016
Rev.: 5

INTRODUCTION

This document serves as the Startup, Shutdown and Malfunction Plan (SSM Plan) for Gateway Energy Coke Company (GECC). GECC operates a non-recovery coke production facility located in Granite City, Illinois. GECC is a major source of hazardous air pollutants (HAPs) and, as such, is subject to multiple National Emission Standards for Hazardous Air Pollutants (NESHAPs) under 40 Code of Federal Regulations (CFR) Part 63, also referred to as Maximum Achievable Control Technology (MACT) standards. Specifically, GECC is subject to the NESHAP for Coke Oven Batteries (MACT L) and the NESHAP for Coke Ovens: Pushing, Quenching, and Battery Stacks (MACT CCCCC). Since the facility is subject to MACT L and MACT CCCCC, the facility is also subject MACT Subpart A. Additionally, GECC operates under Construction Permit 06070020 (“GECC Air Permit”). Therefore, GECC has developed this plan to comply with the startup, shutdown, and malfunction plan provisions required by 40 CFR 63.6(e), 40 CFR 63.310, 40 CFR 63.7310(c), and Permit Condition 4.1.5(a)(i)(D).

All contractors and employees of GECC shall follow these guidelines as detailed in this plan.

Non-recovery coke oven batteries are unique from other industrial processes in that once the ovens are started during the initial heat-up sequence; they are never shutdown. A heat recovery oven battery is never shut down for two primary reasons. Firstly, it would allow the silica brick to cool to below 1,200 °F, which could cause thermal spalling. Secondly, the ovens expand due to thermal growth of single brick elements. Shutting down a battery would cause the bricks to contract to their unheated size which could induce structural failure. Shutting down ovens to a cold state to minimize emissions is not a technically feasible option due to the serious structural damage that would result. Therefore, the short-term stoppage of coke production is not considered a shutdown of the ovens. Therefore, this Startup, Shutdown, and Malfunction Plan addresses those processes at the plant that have a typical startup and shutdown mode.

I. PURPOSE OF THE STARTUP, SHUTDOWN AND MALFUNCTION PLAN (40 CFR 63.6 (e))

This Startup, Shutdown, and Malfunction (SSM) Plan describes procedures for operating and maintaining during startup, shutdown, or malfunction events emissions sources subject to the MACT L and MACT CCCCC and their associated control devices and sources that they control. A list of the emission units and associated control devices subject to startup, shutdown, and malfunction requirements is included as Table I-1. The SSM Plan establishes that the non-recovery coke oven batteries at GECC operate continuously under negative pressure.¹ On the production level, the operations consist of sequences of discrete steps such as coal transfer to coke ovens, pushing coke out of ovens, charging of coal into the ovens and coke transfer activities. These steps are repeated sequentially between three batteries. This plan provides the startup, shutdown, and malfunction procedures for the affected production processes and associated emission points as outlined in Table I-1.

¹ In the event that positive pressure within the common tunnel is observed GECC will implement the corrective actions listed for the loss of draft in Table VII-1.

TABLE I-1. DESCRIPTIONS OF PROCESS EQUIPMENT AND EMISSIONS CONTROLS

Process Source	Process Step	Emission Point	Control Arrangement
Non-recovery coke oven plant distributed in three coke oven batteries identified as A, B and C	Coking of coal	One hundred twenty non-recovery coke ovens distributed in three batteries	The ovens are kept under negative pressure, adding air from the outside to oxidize volatile matter and release the heat of combustion within the oven system. Waste gas emissions are controlled by a lime spray dryer desulfurization unit and baghouse.
	Coke pushing operations	One coke oven flat push hot car (FPHC) machine	During pushing, the emissions are captured in the FPHC multiclone and exhausted through one stack.
	Coal charging operations	One coke oven pushing/charging machine (PCM)	During charging the PCM captures emissions using a hood arrangement. Emissions are controlled by one baghouse and exhausted through one stack.
	Coke quenching	One quench tower	SCE minimizes emissions from the quench tower through proper operation and maintenance of the quench tower baffles.

This SSM Plan also describes GECC's corrective actions and procedures for malfunctioning emission control device components, process equipment, and monitoring equipment used to comply with GECC Air Permit requirements.

The purpose of this startup, shutdown, and malfunction plan is to:

1. Ensure that, at all times, GECC operates and maintains the control systems, affected sources, and monitoring equipment in a manner consistent with safety and with good air pollution control practices designed to minimize emissions to comply with the applicable emission limits;
2. Ensure that GECC is prepared to evaluate and correct malfunctions as soon as practicable after their occurrence in order to minimize emissions of air pollutants; and
3. Reduce the reporting burden associated with periods of startup, shutdown, and malfunction events, including corrective action taken to restore malfunctioning process and air pollution control equipment to its normal manner of operation.

II. DEFINITIONS

a. Definitions set forth in the 40 CFR 63.2:

- i. Startup: "...the setting in operation of an affected source or portion of an affected source for any purpose".
- ii. Shutdown: "...the cessation of operation of an affected source or portion of an affected source for any purpose".
- iii. Malfunction: "...any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limits in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions".

b. Definitions set forth in 40 CFR 63.301:

- i. Startup: “...that operation that commences when the coal begins to be added to the first oven of a coke oven battery that either is being started for the first time or that is being restarted and ends when the doors have been adjusted for maximum leak reduction and the collecting main pressure control has been stabilized. Except for the first startup of a coke oven battery, a startup cannot occur unless a shutdown has occurred.”
- ii. Shutdown: “...the operation that commences when pushing has occurred on the first oven with the intent of pushing the coke out of all of the ovens in a coke oven battery without adding coal, and ends when all of the ovens of a coke oven battery are empty of coal or coke.”
- iii. Malfunction: “...any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures caused in part by poor maintenance or careless operation are not malfunctions.”

c. Definitions used in this SSM Plan that are specific to the individual steps of coke production:

1. Startup of pushing/charging: Commencing operation of the pushing/charging machine (PCM) associated with Batteries A, B, and C. This consists of the sequential process of removing the coke from the oven and charging coal into the oven. The push/charge cycle starts when the coke oven door is removed. Pushing of an oven begins with the first detectable movement of the coke mass and ends when the quench car enters the quench tower. Charging of an oven begins with the insertion of the charging conveyor into the oven and ends with securing the pushing side door of the oven with two to four latches.
2. Coking in non-recovery coke ovens: A process by which coal undergoes destructive distillation under negative pressure to produce metallurgical coke.
3. Shutdown of pushing/charging: Termination of operations, such that the last scheduled oven of a pushing/charging cycle has been emptied of coke, charged with coal and the pushing side door of the oven has been secured with two to four latches.
4. Excess Emissions: An emissions rate exceeding the standards as established in 40 CFR 63 Subpart L, 40 CFR 63 Subpart CCCCC, the GECC Air Permit, and/or any other applicable limit.

III. STARTUP OPERATING PROCEDURES

a) Startup of pushing/charging operations in the coke production sequence:

The startup will be conducted such that emissions are minimized during the event. Pushing and charging startups will be performed according to the applicable GECC Standard Operating Procedure(s) (SOPs). The following steps are followed during the pushing/charging start-up process:

1. Inspect ovens scheduled for pushing/charging in the current cycle to confirm their readiness to be pushed. Ovens must not be pushed unless the visual inspection by the Product Technician or the Machine Operator confirms that there is no smoke in the open space above the coke bed and

there is an unobstructed view of the door on the opposite side of the oven in accordance with 40 CFR 63.7293.

2. Start the PCM baghouse fan and check the differential pressure to ensure that it is within the range required by the GECC Air Permit. Ensure proper operation prior to beginning the pushing cycle.
3. Start the flat push hot car (FPHC) multiclone and check its differential pressure and fan amps. Ensure proper operation prior to beginning pushing of ovens.
4. Set-up the PCM on the first oven of the sequence and start the pushing/charging cycle.

If the differential pressure and fan am ps (where applicable) are not within their prescribed operating ranges, then startup and/or the machinery operation shall be suspended until the problem is diagnosed. Where practicable, pushing or charging operations will be suspended until the baghouse/multiclone returns to normal operating conditions.

IV. SHUTDOWN OPERATING PROCEDURES

Heat-recovery coke oven batteries are unique from other industrial processes in that once the ovens are started during the initial heat-up sequence they cannot be shut down. A heat recovery oven battery cannot be shut down for two primary reasons. First, the shutdown of a battery would result in the cooling of its silica brick to temperatures below 1200°F, which could cause thermal spalling. Secondly, during the operation of a battery its ovens expand due to thermal growth of single brick elements. The shutdown of a battery would cause the bricks to contract to their unheated size, which could induce structural failure. Shutting down ovens to a cold state in order to minimize emissions is not a technically feasible option due to the catastrophic structural damage they would incur.

a) Shutdown of operations of coke production sequence

Scheduled shutdown events will be conducted in a manner such that emissions will be minimized. Shutdown events are limited to times when the PCM, including its baghouse, cease operation. SCE will also shut down the FPHC whenever the PCM is removed from service.

The PCM baghouse will remain in service and will be operated within the acceptable parameter values, including within pressure ranges prescribed in GECC Air Permit, until the charging side door of the last oven in the cycle has been re-installed and secured with latching mechanisms. After this condition is satisfied, the PCM and the FPHC will be shut down in accordance with Standard Operating Procedures.

b) Planned or scheduled maintenance outage

GECC does not typically conduct facility-wide shutdown events; it conducts scheduled shutdown events for specific process units and control devices (e.g., HRSG units, FGD system). These shutdown events include, but are not limited to, HRSG and FGD shutdowns to perform maintenance. GECC's shutdown events shall be coordinated in a manner that will minimize emissions. In regards to HRSG and FGD maintenance, "planned" or "scheduled" shall mean the following:

- Planned or Scheduled FGD Maintenance: preventative maintenance, inspection and repair of FGD components that is planned for and scheduled at least 21 days prior to commencement of such activity. If forty-eight (48) hours' notice is provided prior to beginning FGD maintenance work, that work is considered planned or scheduled FGD maintenance if the work was originally scheduled no less than 21 days prior to beginning the work.
- Planned or Scheduled HRSG Maintenance: preventative maintenance, inspection and repair of HRSG components that is planned for and scheduled at least 7 days prior to commencement of such activity. If forty-eight (48) hours' notice is provided prior to beginning HRSG maintenance work, that work is considered planned or scheduled HRSG maintenance if the work was originally scheduled no less than 7 days prior to beginning the work.

All planned or scheduled FGD and HRSG maintenance, as well as other maintenance activities in which there is greater than forty-eight (48) hours' notice prior to the beginning of the scheduled maintenance (collectively "scheduled maintenance") shall be conducted in accordance with the following procedures:

1. Plant outages will be coordinated, communicated and planned in a timely manner. To the extent practicable, HRSG maintenance outages shall be scheduled during Scheduled FGD maintenance periods.
2. The critical path of maintenance will be determined to reduce the duration of an outage.
3. In accordance with GECC's Air Permit, condition 4.1.5 (a)(i)(D)(2) requires that this plan include procedures for reducing the average charge rate to a maximum of 42.5 tons of wet coal per oven during bypasses occurring as part of planned inspections and maintenance of the FGD system. The following is the procedure for reducing the charge:
 - a. If practicable, GECC will (beginning forty-eight (48) hours prior to the beginning of the scheduled maintenance (i.e. the opening of the stack lid(s)), and if that is not practicable, as soon as the Facility can do so) reduce the coal charged to the affected ovens to no more than a 42.5 ton average on a wet weight basis.
 - b. GECC may begin increasing the charge weights to the ovens after the stack lid(s) have been closed.

c) Unscheduled maintenance outage

In the event of an unscheduled maintenance outage that is anticipated to be greater than 24 hours in duration, the following procedures will be utilized to reduce coal charge weights if practicable:

1. As soon as GECC becomes aware that an unscheduled maintenance outage will last more than 24 hours, GECC will, with the first charge on the group of affected ovens (i.e. the ovens that vent to the applicable bypass vent stack), reduce coal charges to these ovens by two tons per oven per charge cycle, until either the bypass venting has concluded or an average charge weight of 42.5 tons per oven across the affected ovens has been reached.
2. GECC may begin increasing the charge weights to the ovens after the stack lid(s) have been closed.

V. MALFUNCTIONS

Malfunction is defined in Section II of this SSM Plan. During a malfunction event, the following general response steps will be performed:²

1. Malfunction identification - Potential causes of malfunctions and the corresponding response procedures that should be performed are outlined in this SSM Plan.
2. Notification – When a malfunction occurs, the appropriate supervisory personnel who are present at the facility at the time of the event (e.g. General Manager, Environmental Manager, Operations Manager, Maintenance Manager, etc.) will be notified immediately. These individuals will provide assistance and guidance as necessary to successfully perform the response actions and notify the Environmental Manager if he/she is not present at the facility.
3. Diagnosis and malfunction cause determination - Malfunctions will be analyzed in order to determine the appropriate corrective actions. GECC will perform a Root Cause Failure Analysis (RCFA) for all malfunction events that qualify as a Bypass Venting Incident, which is defined as all Bypass Venting that lasts longer than thirty (30) cumulative minutes for all stacks at an Affected Coke Oven Battery over a twenty-four hour period. The RCFA shall contain the information set forth in Section IX of the PMO Plan.
4. Corrective action procedures – After the cause(s) of the malfunction has been determined, any appropriate corrective action(s) will be implemented to resolve the malfunction, restore the affected process equipment back to normal operation, and reduce the likelihood of the malfunction's recurrence. Potential corrective action measures are listed in this SSM Plan.
5. Malfunction event documentation – The malfunction event will be appropriately documented using the “Malfunction Report Form” (Attachment A).
6. Reporting – GECC will report the malfunction to the IEPA in accordance with the GECC Air Permit.

VI. RECORDKEEPING AND REPORTING

As required by 40 CFR 63.10(b), GECC will maintain and make available for inspection applicable records, logs, reports, and/or notifications pertaining to startup, shutdown, and malfunction events for at least five (5) years following each occurrence.

Production data is recorded on the PCM and flat push hot car sheets. Common tunnel temperature and pressure is recorded by the computerized operating system.

Periodic Compliance reports and Immediate SSM reports will be submitted pursuant to 40 CFR §63.6(e)(3), 40 CFR §63.10(d)(5)(i), 40 CFR §63.10(d)(5)(ii), 40 CFR §63.311(d)(2), and 40 CFR §63.7341(c)(4.)

² Please note that some of these steps may be completed out of the order listed, as appropriate.

The following summarizes GECC's SSM Plan reporting requirements:

Periodic Compliance Reports

In accordance with 40 CFR 63.10(d)(5)(i), 40 CFR 63.311(d)(2), and 40 CFR 63.7341(c)(4), GECC will submit Periodic Compliance reports on a semiannual basis to the US EPA and IEPA. At a minimum, these reports will include the following:

1. Information required for GECC's 40 CFR Part 63 Subpart L and Subpart CCCCC semiannual compliance certifications;
2. The description and duration of each SSM event that occurred during the reporting period;
3. Actions taken to minimize emissions during the event;
4. An indication as to whether or not the actions that were performed during each SSM event were consistent with the SSM Plan;
5. The name, title, and signature of GECC's responsible official who is certifying the accuracy of the report.

Immediate SSM Reports

In accordance with the requirements of 40 CFR 63.10(d)(5)(ii) and 40 CFR 63.7341(d), GECC must implement the following procedures if an action is taken during a startup, shutdown, or malfunction event which is not consistent with the procedures specified in this plan (including actions taken to correct a malfunction), and the source exceeds any emission limitations specified in the relevant MACT standards.

1. Record the actions taken for the event.
2. Within 2 working days after the actions that are inconsistent with this plan have commenced, the IEPA and US EPA Region V must be notified of the event either by telephone or facsimile (FAX).
3. Within 7 working days after the actions that are inconsistent with this plan have ended, a letter must be delivered to the IEPA and US EPA Region V. The letter is required to contain the following:
 - a. The name, title, and signature of the owner or operator or other responsible official who is certifying its accuracy;
 - b. An explanation of the circumstances of the event;
 - c. The reasons for not following the startup, shutdown, and malfunction plan;
 - d. A description of all excess emissions and/or parameter monitoring exceedance which are believed to have occurred (or could have occurred in the case of malfunctions); and
 - e. A description of any actions taken to minimize emissions.

Plan Modifications or Revisions

Modifications may be made to this SSM Plan as necessary to satisfy the requirements of the rule or to reflect changes in equipment or procedures. In accordance with 40 CFR 63.6(e)(3)(viii), unless the permitting authority provides otherwise, the owner or operator may make such revisions to this SSM Plan without prior approval from IEPA/US EPA Region V. However, each such revision to this SSM Plan will be reported in the semiannual report required by 40 CFR 63.10(d)(5). If this plan fails to address or inadequately addresses an event that meets the characteristics of a malfunction, the plan will

be revised within 45 days after the event. Any revisions to the plan that alter the scope of the SSM activities at GECC or otherwise modify the applicability of any emission limit, work practice requirement, or other requirement in a standard established under 40 CFR §63, shall not take effect until after GECC has provided a written notice describing the revision to IEPA/US EPA Region V. The SSM Plan revisions will be documented on the ***SSM Plan Document Control Form***, which is included as **Attachment B**.

Any modification to the PMO Plan is required to be submitted to USEPA for approval under the Consent Decree. However, this SSM Plan is considered a separate, stand-alone document and will be submitted as required under 40 CFR Part 63 and GECC's Air Permit.

VII. MALFUNCTION LIST AND RESPONSE PROCEDURES

The following tables list potential malfunctions associated with affected units and their corresponding monitoring and air pollution control equipment:

Table VII-1	Bypass Vent Stack Lids and Flue Gas Desulfurization (FGD) Issues ³
Table VII-2	FPHC Multiclone and Related Process and Equipment
Table VII-3	Quench Tower Baffles
Table VII-4	Door Leaks
Table VII-5	Charging Emissions

³ The information provided in this SSM Plan for the bypass vent stack lids and FGD system is included in accordance with GECC's Air Permit Condition 4.1.5(a)(i)(D). Please note that the bypass vent stack lids and the FGD system are not subject to any requirements under 40 CFR 63, Subparts A, L, or CCCCC.

Tables

TABLE VII-1 BYPASS VENT STACK LIDS AND FGD RELATED ISSUES

EVENT	ALARM / EVENT NOTIFICATION	OPERATING PROCEDURES DURING MALFUNCTION EVENT	POTENTIAL MALFUNCTION CAUSES	RECOMMENDED ACTIONS⁴
Loss of Power / Controls	Visual by Operator; Human Machine Interface (HMI); Display in control room	The FGD baghouse and the SDA will be bypassed and/or the bypass vent stack lids will open to sustain drafting of battery. Plant personnel will immediately diagnose the problem and initiate corrective actions as soon as possible to correct the issue. If the bypass event lasts more than 24 hours, reduce charging tonnage according to the procedures detailed in IV(b)(3) of this plan.	Electrical service provider failure; Failure of Breaker; Failure of PLC card; Failure of instrument air system	Wait for power restoration; Use on-board generators to power mobile equipment to safety; Reset /Replace breaker(s); Reset / Replace PLC Card; Check instrument air system for leaks/excess water/particulate matter.
Loss of Draft	Visual by Operator; HMI Display	The FGD baghouse over time will shut off slurry flow due to low outlet temperature and the baghouse could be bypassed after 30 minutes at low low temperature resulting in the stack lids opening to sustain drafting of battery. Plant personnel will immediately diagnose the problem and initiate corrective actions as soon as possible to correct the issue. If the bypass event lasts more than 24 hours, reduce charging tonnage according to the procedures detailed in IV(b)(3) of this plan.	Electrical service provider failure; Problem with pressure transmitter or PLC Card; Loss of ID Fans Failure of Control System Components	Wait for power restoration; Repair or replace pressure transmitter; Replace PLC card; Assess cause of ID Fan loss -If non-critical loss: -Correct failure -Reset faults -Restart ID Fan -Restore FGD Baghouse, lime slurry flow, any opened vent stack lids -If critical loss: -Ready stand-by ID Fan -Start stand-by ID Fan -Restore FGD Baghouse, lime slurry flow, any opened vent stack lids -Prepare failed fan for relevant maintenance Test/Troubleshoot/Reset /Repair/Replace Electrical Infrastructure Components

⁴ Please note that Tables VII-1 through VII-5 provide recommended actions for each malfunction event; however, these recommended actions are not intended to be limiting if GECC personnel identify a more effective response for a given malfunction event.

EVENT	ALARM / EVENT NOTIFICATION	OPERATING PROCEDURES DURING MALFUNCTION EVENT	POTENTIAL MALFUNCTION CAUSES	RECOMMENDED ACTIONS⁴
			<p>Duct Failure</p> <p>Material Blockage or Pluggage</p> <p>System Leaks</p> <p>Loss and/or Failure of FGD system components</p> <p>Emergency Bypass Vent Stack Lid Failure to Open</p>	<p>Identify Failure and Repair Duct</p> <p>Remove/Alleviate Material Blockage or Pluggage</p> <p>Identify and Repair Leaks</p> <p>Test/ Troubleshoot/Reset / Repair/Replace FGD System Components</p> <p>Troubleshoot/Repair Emergency Bypass Vent Stack Lid</p> <p>Follow applicable SOP for restart of affected equipment</p>
High or Low Differential Pressure	Visual by Operator; HMI Display; Bag Leak Detection System Alarm	Notify the Product Technician Control Room Operator. Inspect baghouse to determine cause of high or low pressure or other appropriate methods of troubleshooting.	Solenoid pilot valve malfunction; Breaker trip; Blown fuse; Grounded/shorted wiring; Ductwork breached; Faulty I/O card, High volume, low pressure blower(s) failure (bag cleaning)	<p>Listen to verify the solenoid valves are firing. Check for momentary air venting each time they fire. Clean or replace, if necessary;</p> <p>Check the air supply to ensure the blower(s) is providing adequate pressure;</p> <p>Check for a plugged filter in the compressed air line;</p> <p>Diagnose and repair motor;</p> <p>Reset or change breaker, replace fuses, repair wiring, change motor, troubleshoot, replace and repair equipment;</p> <p>Replace I/O card</p>
FGD Bypass	Visual by Operator, HMI Display	Notify Maintenance/Product Technicians/Utility, as appropriate, to immediately diagnose the problem and initiate corrective actions as soon as possible to correct the issue. If the bypass event lasts more than 24 hours, reduce charging tonnage according to the procedures detailed in IV(b)(4) of this plan.	<p>SDA Failure</p> <p>Loss of Water Supply to Lime/Slurry Mixing System</p>	<p>Investigate breakdown, and diagnose failure;</p> <p>Replace defective atomizer with spare atomizer;</p> <p>Repair or replace slurry gear box;</p> <p>Thaw /unplug / clear lines;</p> <p>Reestablish water flow.</p> <p>Determine source of water loss;</p> <p>Repair or replace defective equipment;</p> <p>Thaw water lines;</p> <p>Check service water tank level</p>

EVENT	ALARM / EVENT NOTIFICATION	OPERATING PROCEDURES DURING MALFUNCTION EVENT	POTENTIAL MALFUNCTION CAUSES	RECOMMENDED ACTIONS⁴
			<p>Lime or Slurry System Blockage, Slurry Accumulation on Filters</p> <p>PAC System Blockage or Off-Line</p> <p>Fly Ash in FGD Baghouse Hopper Exceeding Maximum Capacity</p>	<p>Shift to alternative line/pump; Replace grit screens; Clear slaker blockage; Use Sublime to clear slurry line and atomizer blockage; Thaw lines /system; Clean filters, atomizers;</p> <p>Check power supply; Inspect air filter on blower motor; Repair/replace feeder motor, blower motor, or level sensor; Clear blockage in delivery line; Order PAC.</p> <p>Check power supply; Repair/replace feeder motor, blower motor, or level sensor; Clear blockage in material line; Empty hoppers; Utilize vacuum truck for clean-up</p>
Heat Recovery Steam Generator Off-Line	Visual by Operator; HMI Display	The bypass vent stack lids will open to sustain drafting of battery. Plant personnel will immediately diagnose the problem and initiate corrective actions as soon as possible to correct the issue. If the bypass event lasts more than 24 hours, reduce charging tonnage according to the procedures detailed in IV(b)(3) of this plan.	HRSG tube leak; Steam or water leak; Loss of boiler feed water; Mechanical breakdown of HRSG system; Excessive or insufficient steam pressure; Instrumentation errors; Water level fluctuations; Frozen piping; Elevated outlet steam temperatures	Ensure safety of boiler and equipment; Repair the boiler leaks; Contact US Steel Control Room to determine whether supply or outlet steam issues are attributable to activities at US Steel; Repair instrumentation as necessary; Thaw frozen piping; Establish sufficient feed water supply
Vent Stack Lid Remains Closed during low/positive differential pressure in the common tunnel	Low/Positive differential pressure in common tunnel	Open working vent stack lids to produce draft Attempt to manually open stuck lid to produce draft	Frozen/faulty actuator on stack or PCB; Frozen HRSG transmitter Faulty I/O card	Check heat tracing lines; Replace actuator(s); Replace frozen transmitter; Replace I/O card;

TABLE VII-2 FPHC MULTICLONE

EVENT	ALARM / EVENT NOTIFICATION	OPERATING PROCEDURES DURING MALFUNCTION EVENT	POTENTIAL MALFUNCTION CAUSES	RECOMMENDED ACTIONS
Excess Opacity from Multiclone Stack	Visual	If pushing/charging at the time of event, if practicable, the operation will cease until the problem is diagnosed. Contact Maintenance for assistance. Check fan amps and the differential pressure.	Ovens are not completely coked out; Holes in the ductwork; Flow constrictions caused by dents, dust accumulation, etc.; Fan erosion	Notify Maintenance to troubleshoot, repair, or replace defective equipment associated with the FPHC multiclone; Note that such repairs must be completed within 30 days of detection in accordance with 40 CFR 63.7300(c)(1).
High or Low Differential Pressure Range of 1-4.6" w.g. normal operating range	FPHC Operator Pressure Gauge Reading	If pushing/charging at the time of event, if practicable, the operation will cease until the problem is diagnosed. Contact Maintenance to troubleshoot, repair or replace defective equipment.	Differential Pressure Gauge malfunction; Blockage in pressure gauge line; Multiclone equipment failure; Leakage in tube sheet; Frozen transmitter /lines; Damper positioned close	Remove blockage in pressure gauge line; Thaw, clear transmitters and lines; Open damper and pin to an appropriate position as established in the facility's operating procedures; Implement repairs to multiclone equipment as necessary
High or Low Fan Amps/ Fan Failure 64.7 amps min.	FPHC Operator Fan Amp Gauge Reading	If pushing/charging at the time of event, if practicable, the operation will cease until the problem is diagnosed. Notify Maintenance to troubleshoot, repair or replace defective equipment.	Multiclone equipment failure; Blockage in multiclone; Breaker Trip; Soft start failure; Air leaks in system; Fan misalignment; Bearing failure; Motor failure	Check and repair worn bearings, bent/broken shaft, worn couplings; Change fan assembly; Check and clear blockage in multiclone; Reset/replace breaker; Replace fuses, wiring, etc. as needed; Check for air leaks and repair as needed; Repair/replace motor

TABLE VII-3 QUENCH TOWER

EVENT	ALARM / EVENT NOTIFICATION	OPERATING PROCEDURES DURING MALFUNCTION EVENT	POTENTIAL MALFUNCTION CAUSES	RECOMMENDED ACTIONS
Loss of water to baffles /quench	Visual	Repair and bring back on line as promptly as possible. Wash the baffles as soon as possible according to the Environmental Manager's, or delegate's recommendation.	Failure of motor/pump assembly; Loss of service water; Loss of air pressure; Loss of power; Loss of controls; Clogged sprays; Frozen valves	Replace motor/pump assembly; Unclog sprays as needed; Check heat tracing lines and thaw if possible, daily operation of quench pumps during freezing periods.
Loss of baffles	Visual	Repair as promptly as possible, but not later than 30 days from the date of failure.	Incidental structural damage; Weather-related damage	Repair/replace baffles and structure

TABLE VII-4 Fugitive Emissions from Oven Doors⁵

Event	Potential malfunction causes	Preventative maintenance procedures	Recommended actions
Fugitive Emissions from Doors or Lack of Draft	<p>Failure of Uptake Damper and/or Associated Components</p> <p>Material Blockage or Pluggage</p> <p>System Leaks (e.g. Door not seated correctly, damaged door, etc.)</p> <p>Failure to Follow Applicable Procedure</p>	<p>Routine inspection of Uptakes, Door Dampers, Oven Doors, and Sole Flue Dampers</p> <p>Monthly Oven Door Inspection for structural integrity and leaks.</p> <p>Monthly Stack Lids Inspections for structural and mechanical integrity.</p> <p>Plant Personnel inspect door sills for material blockages during and after pushing/charging of ovens and remove spilled materials to ensure proper oven door seal</p>	<p>Check and Adjust Uptake Dampers and/or Associated Components</p> <p>Reset/Repair/Replace Damper Block</p> <p>Remove/Alleviate Material Blockage or Pluggage</p> <p>Check and Adjust Common Tunnel Draft</p> <p>Check and Adjust Sole Flue Dampers</p> <p>Check and Adjust Door Dampers</p> <p>Ensure Proper Seal of Oven Door</p> <p>Identify and Repair Leaks</p>
Over Pressurization of the System	<p>Failure of Stack Lid Solenoid and/or Associated Components</p> <p>Failure to Follow Applicable Procedure</p>	<p>Monthly Stack Lids Inspections for structural and mechanical integrity.</p>	<p>Open Emergency Bypass Vent Stack (See also Loss of Draft in Table VII-1)</p>

⁵ Events and Recommended actions cover the entire 48 hour coking cycle.

TABLE VII-5CHARGING EMISSIONS (PCM BAGHOUSE)

Identification of potential malfunctions that affect charging emissions	Preventative maintenance procedures to minimize their occurrences	Corrective action procedures
Loss of power, controls	N/A (typically weather related)	Inspect breakers; Repair breakers as necessary
Loss of compressed air	Daily parametric monitoring and inspection of dilution dampers, Weekly inspections of cartridge cleaning system	Locate and repair air leak; Inspect the valve; Clean or repair as needed
Damaged filters	Weekly checks of filters	Replace filters
Cartridge filtering action Impaired	Weekly inspections for: <ul style="list-style-type: none"> • Cleaning air supply • Solenoid valve operation • Timer • Excessive moisture build up • Static electricity build up 	Replace cartridge
Excess Opacity from PCM Baghouse Stack / Oven Charging as determined by 40 CFR 63.303(d)	Weekly inspections of: <ul style="list-style-type: none"> • Cartridges • Solenoid valve operation • Timer • Hopper discharge • Excessive moisture on Cartridges • Structure Routine monitoring of Common Tunnel Draft	<p>If pushing/charging at the time of event, the operation will cease until the problem is diagnosed. Contact the appropriate operations personnel (e.g., Shift Team Leader) immediately; Inspect baghouse for evidence of fire; Check cartridge installation, repair as needed; Tighten cartridge clamp/mounting plate assembly; Replace damaged cartridges; Replace cartridges; Check tube sheet for warping and joint deterioration, repair as needed; Check fan speed, cold air damper position, adjust to specified rating; Check cleaning air supply; adjust to psig required; Check solenoids and adjust as needed; Check fan rotation, fan speed damper position; Check breakers for damage and repair as needed; Check and adjust uptake dampers and/or associated components; Reset/Repair/Replace Damper Block; Check and adjust Common Tunnel Draft.</p> <p>Please note that two or more of the corrective actions listed may be carried out to resolve the malfunction. Not all the procedures listed will have to be carried out to resolve the malfunction.</p>

Identification of potential malfunctions that affect charging emissions	Preventative maintenance procedures to minimize their occurrences	Corrective action procedures
<p>High or Low Differential Baghouse Pressure 2-12" w.g. Normal range of operation</p>	<p>Weekly inspections of:</p> <ul style="list-style-type: none"> • Cartridges • Solenoid valve operation • Timer • Hopper discharge • Excessive moisture on Cartridges • Structure 	<p>If pushing/charging at the time of event, the operation will cease until the problem is diagnosed. Contact the appropriate operations personnel (e.g., Shift Team Leader) immediately; Check fan speed, damper position, adjust to specified rating; Check cleaning air supply, adjust to psig as required; Check solenoids and adjust as needed; Check on and off interval, adjust as required; Replace timer; Remove cause of blockage and empty hopper; Replace plugged sensing lines; Check tube sheet for warping and joint deterioration; Install gaskets as necessary; Clear blockage from spark arrestor screens Please note that two or more of the corrective actions listed may be carried out to resolve the malfunction. Not all the procedures listed will have to be carried out to resolve the malfunction.</p>
<p>Fresh Air damper failure</p>	<p>Maintenance personnel inspect the fresh air damper as part of the weekly preventative maintenance activities.</p>	<p>If pushing/charging at the time of event, the operation will cease until the problem is diagnosed. Contact the appropriate operations personnel (e.g., Shift Team Leader) immediately. Replace failed mechanical parts. Diagnose and repair electrical components</p>

ATTACHMENT A: MALFUNCTION REPORT FORM

MALFUNCTION REPORT FORM SunCoke Energy	
<i>This form is to be completed during or immediately following any emission control devices or parameter monitoring device malfunction event. Information provided will be relied upon for meeting reporting and recordkeeping requirements.</i>	
Date/Time malfunction identified:	
Name and title of initial responder:	
Name and title of Team Leader or responsible official notified of event:	
Malfunction description:	
Cause of malfunction:	
List corrective action(s) taken:	
Date/Time malfunction corrected:	
Total duration of malfunction:	
Was malfunction listed in SSM Plan? (Check one) <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, was the response consistent with SSM Plan? (Check one) <input type="checkbox"/> Yes <input type="checkbox"/> No	
Provide explanation if response was inconsistent with SSM Plan*:	
Did SSM Plan appropriately address the malfunction? (Check one) <input type="checkbox"/> Yes <input type="checkbox"/> No**	
Provide any recommendations for revisions or modifications to current SSM Plan to better accommodate future malfunctions:	
Whether any excess emissions and/or parameter monitoring exceedances are believed to have occurred during the malfunction	
List any additional measures taken to reduce excess emissions	
Name of investigating official:	
Signature of investigating official:	
<small>*An immediate report is to be submitted to IEPA/US EPA Region V following any response action taken that was inconsistent with the SSM Plan **SSM Plan is to be revised within 45 days</small>	

ATTACHMENT B: SSM PLAN DOCUMENT CONTROL FORM

- *To be completed every time the SSM Plan is revised*
- *Provide reference to section(s) that have been revised under “Details of Revision”*

[illegible]

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

ATTACHMENT B – EXAMPLE OF ENVIROMENTAL CRITICAL PM

The following is an example report of environmental critical Preventive Maintenance tasks that are managed within the EAM system. Environmental critical PMs continue to evolve and the most up-do-date list is maintained in the EAM system.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

Example Environmental Critical PMs

<u>Work Order</u>	<u>Description</u>	<u>Location</u>
830295	PM 60 AIR INGRESS DETECTION CHECK MONTHLY	060 HRSG
817147	PM 60 AIR INGRESS DETECTION CHECK SEMI-ANNUAL	060 HRSG
830261	PM GC CEMS Operation Checks Daily	CEMS-52
823312	PM GC CEMS Sorbant Trap Change Out Weekly	MO-5292
823317	PM GC Common Tunnel Pressure Inst Weekly	010
830272	PM GC COMMON TUNNEL PRESSURE INSTRUMENTS MONTHLY	010
823307	PM GC FGD ID Fans Monthly	F-5200A
752113	PM GC FPHC Multiclone Inspection Annual	HC-43
813432	PM GC FPHC Multiclone Magnehelic Pressure Gages Quarterly	HC-43
830239	PM GC FPHC Multiclone Monthly	HC-43
821199	PM GC HRSG 01 Retractable Sootblower Monthly	H-6101
841221	PM GC HRSG 02 Retractable Sootblower Monthly	H-6102
833767	PM GC HRSG 03 Retractable Sootblower Monthly	H-6103
802551	PM GC HRSG 04 Retractable Sootblower Monthly	H-6104
841222	PM GC HRSG 05 Retractable Sootblower Monthly	H-6105
833769	PM GC HRSG 06 Retractable Sootblower Monthly	H-6106
752579	PM GC Mech Integ Battery Vent Stack Quarterly	VS-0010
752583	PM GC Mech Integ Battery Vent Stack Quarterly	VS-0030
752589	PM GC Mech Integ Battery Vent Stack Quarterly	VS-0050
752591	PM GC Mech Integ Battery Vent Stack Quarterly	VS-0091
752595	PM GC Mech Integ Battery Vent Stack Quarterly	VS-0111
752600	PM GC Mech Integ Battery Vent Stack Quarterly	VS-0070
752111	PM GC Mech Integ FGD Vent Stack Quarterly	S-6244
821189	PM GC OPS - VS0010 VENT STACK 1 MONTHLY	VS-0010
837274	PM GC OPS - VS0030 VENT STACK 2 MONTHLY	VS-0030
821191	PM GC OPS - VS0050 VENT STACK 3 MONTHLY	VS-0050
837276	PM GC OPS - VS0070 VENT STACK 4 MONTHLY	VS-0070
819594	PM GC OPS - VS0091 VENT STACK 5 MONTHLY	VS-0091
837277	PM GC OPS - VS0111 VENT STACK 6 MONTHLY	VS-0111
813469	PM GC OPS Ash Handling Quarterly	TK-375
813468	PM GC OPS FGD BAGHOUSE HOPPER QUARTERLY	BN-5201
841342	PM GC OPS PCM BAGHOUSE FILTER QUARTERLY #2	DC-4101
844552	PM GC OPS PCM BAGHOUSE FILTER QUARTERLY #3	DC-4101
821203	PM GC OPS PCM Dust Collector Monthly	DC-4101
821197	PM GC PCM Dust Collector Monthly	DC-4101
841219	PM GC PCM Dust Collector Weekly	DC-4101
830274	PM GC PLC DATA BACKUP MONTHLY	072
833798	PM GC PLC PANEL CLEANOUT - CONTROL ROOM - QUARTERLY	072
830254	PM GC Screener Dust Collector Monthly	DC-3404
837330	PM GC Vent Stack VS-0030 Inspect/Clean/Rod Out VS Transmitter Taps 2 wks	VS-0030

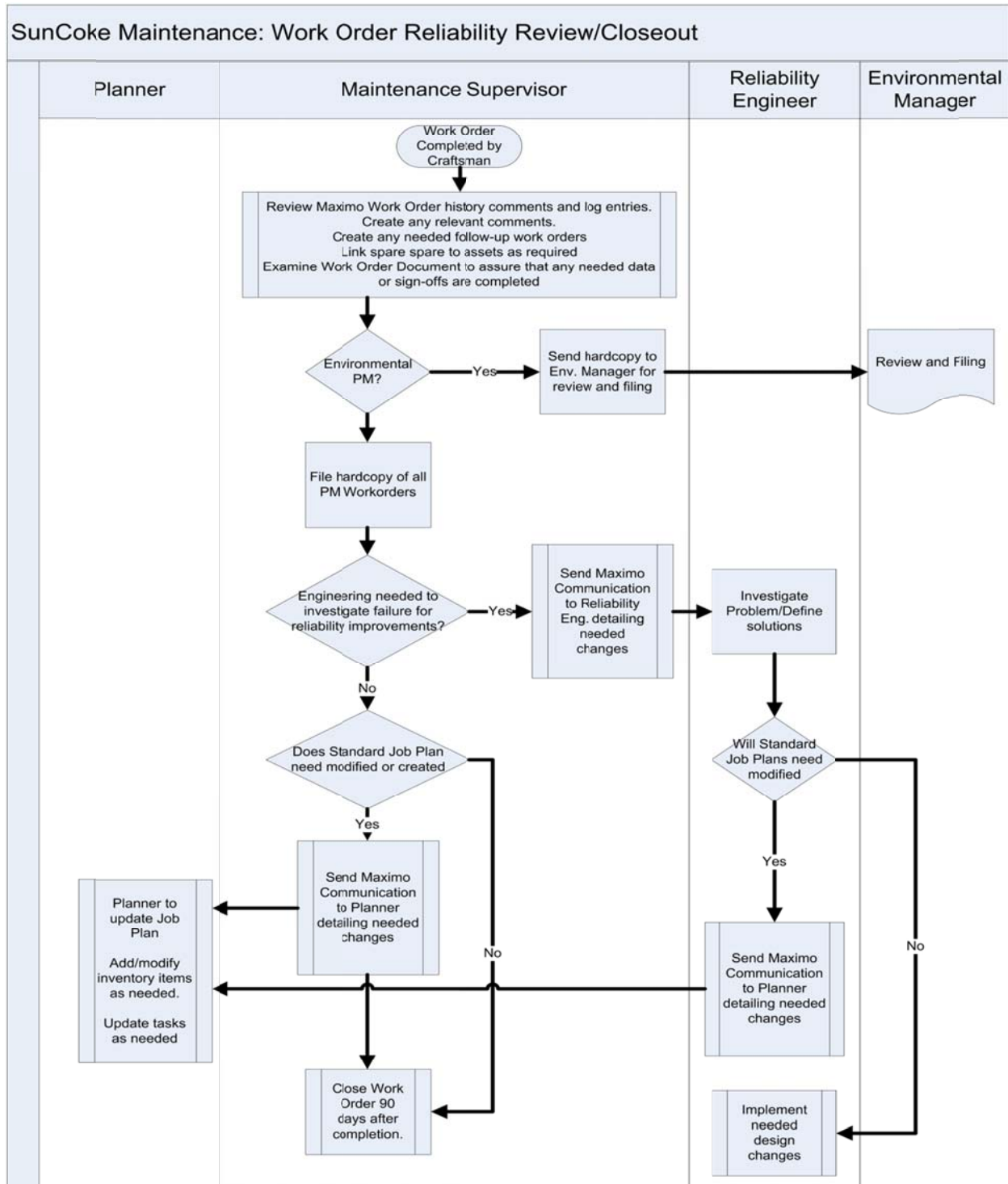
Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

Example Environmental Critical PMs - Continued

<u>Work Order</u>	<u>Description</u>	<u>Location</u>
841269	PM GC Vent Stack VS-0030 Inspect/Clean/Rod Out VS Transmitter Taps 2 wks	VS-0030
813462	PM GC Vent Stack VS-0050 Inspect/Clean/Rod Out VS Transmitter Taps 2 wks	VS-0050
841271	PM GC Vent Stack VS-0070 Inspect/Clean/Rod Out VS Transmitter Taps 2 wks	VS-0070
813464	PM GC Vent Stack VS-0091 Inspect/Clean/Rod Out VS Transmitter Taps 2 wks	VS-0091
827462	PM GC Vent Stack VS-0111 Inspect/Clean/Rod Out VS Transmitter Taps 2 wks	VS-0111

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

ATTACHMENT C – PM WORKFLOW PROCESS



1

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

ATTACHMENT D – PM EXTENSION FORM

The GECC MWP requires all request to extend environmental critical PM due dates be approved by the plant Environmental manager.

PM EXTEND DUE DATE REQUEST					
Date:		Requestor:			
General Equipment Information					
Site:					
Safety Critical: <input type="checkbox"/> Environmental Critical: <input style="background-color: yellow;" type="checkbox"/> N/A: <input type="checkbox"/>					
PM Plan # (Maximo)					
Associated Job Plan(s) #					
All Equipment Affected by Change					
Recommended Effective Date					
Outstanding Work Orders #					
Reason/Justification for Extension:					
Submitted by PMC Name:				Signature:	
Approvals					
Maintenance Manager Name:				Signature:	
Reliability Engineer Name:				Signature:	
Additional Approvals for Safety / Environmental Critical					
Safety Manager (Safety Critical) Name:				Signature:	
Environmental Manager (Env. Critical) Name:				Signature:	
General Manager Name:				Signature:	
Follow – Up					
Changes Made by:				Date Changes Made:	

Gateway Energy and Coke Company Preventive Maintenance and Operation Plan

ATTACHMENT E – ENVIRONMENTAL: MANAGEMENT OF CHANGE

The following environmental actions may be considered prior to making a change to any plant equipment or process.

Standard Actions (Oil)							
<div> Find: Select Action </div> <div> List Standard Action Log </div> <div> Advanced Search Save Query Bookmarks </div> <div> Standard Actions Filter 1 - 13 of 13 Download </div>							
Standard Action	Description	Type	Timing	Status	Category	Organization	Site
1015	Determine if the change affects quench water or the quench pond operation.	ENVIRON	PRE START	ACTIVE			
1013	Determine if the change affects the water balance at the site.	ENVIRON	PRE START	ACTIVE			
1008	Provide requirement for new emissions monitoring device (T/C, dP, analyzers, etc.)	ENVIRON	PRE START	ACTIVE			
1010	Determine if the change introduces a new process vent or modification of an existing one.	ENVIRON	PRE START	ACTIVE			
1052	Determine if the change impacts the capacity of wastewater treatment system components.	ENVIRON	PRE START	ACTIVE			
1017	Determine if the change complies with existing permit requirements.	ENVIRON	PRE START	ACTIVE			
1014	Determine if the change affects water quality that is subject to a regulatory standard.	ENVIRON	PRE START	ACTIVE			
1006	Update environmental records for emissions from existing or new sources of known pollutants (VOC, SO	ENVIRON	PRE START	ACTIVE			
1011	Determine if the change creates a new process wastewater stream or the re-routing of an existing one	ENVIRON	PRE START	ACTIVE			
1018	Determine if the change affects environmental compliance requirements.	ENVIRON	PRE START	ACTIVE			
1007	Document additional regulated pollutants	ENVIRON	PRE START	ACTIVE			
1009	Determine impact to the method of operation or design of an air emission unit.	ENVIRON	PRE START	ACTIVE			
1016	Determine if the change will produce a solid or liquid waste.	ENVIRON	PRE START	ACTIVE			
<input type="checkbox"/> Select Records							

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

ATTACHMENT F – RELIABILITY STUDIES PROJECT LIST

Gateway Energy and Coke Company - Reliability Studies List (pursuant to CD Paragraphs 38-40)

#	Type	Project Title	Project Description	Date Implemented	Reasons Implemented
1	HRSG	Diamond Power Study on Tube Erosion	Diamond Power completed a study on the rotary soot blower system. Rotary sootblowers were identified as a potential source of tube erosion. The sootblower piping was rerouted based on the study's findings to reduce this potential.	2013	Improve HRSG reliability and reduce the potential of erosion from sootblowers.
2	HRSG	Reduced Sootblower Steam Pressures	Lowered the steam pressures on the HRSG sootblowers to reduce potential tube erosion and refractory damage.	2010	Improve HRSG reliability by reducing the potential for tube erosion and refractory damage from sootblowers.
3	HRSG	Increased Sootblower Lance Insertion Point	Changed mechanical operation of the sootblower sequence to increase the sootblower lance insertion depth prior to releasing steam for sootblowing.	2010	Improve HRSG reliability by reducing the potential for tube erosion and refractory damage from sootblowers.
4	HRSG	Solid Refractory Backed Door for HRSGs	Installed new design of solid refractory backed door. Previous design required installation of single bricks as door was replaced.	2012	Improve HRSG reliability and reduced HRSG offline time by eliminating the need to re-brick the HRSG doors.
5	HRSG	Removal of HRSG Casing Drain	The casing drain on the bottom side of the HRSG was removed to reduce the potential for damage to the floor refractory of the HRSG.	2010	Improve HRSG reliability by reducing potential for floor refractory damage. The metal drain pipe had the potential to act as a heat sink, causing thermal damage to the floor refractory.
6	HRSG	New Floor Refractory and Super Heat Baffles	New refractory was designed and poured for the floor in all six HRSGs and changed the material of construction and design for the lower center super heat baffle from single bricks to a solid piece of refractory.	2010	Improve HRSG reliability and offline time by reducing the time required to install the baffle brick and also reduced the potential for floor refractory damage.
7	HRSG	Mechanical Integrity Inspection Program for HRSG Tubes	Ultrasonic thickness (UT) readings are taken during each outage to measure tube degradation and develop maintenance plans to optimize HRSG tube reliability.	2010	Improve HRSG reliability by improving process to identify tube degradation and replace tubes prior to failure.
8	HRSG	Stack Pressure Transmitter Upgrades	Install new enclosures for the stack pressure transmitters.	2015 target completion	Improve instrument reliability by reducing the potential for stack lid low draft trips caused by erroneous readings.
9	HRSG	Tube Shield Upgrades	Tube shields with a higher corrosion allowance and different metallurgy were installed on tubes in sootblower pathways for all HRSGs.	Began in 2011, ongoing	Improve HRSG reliability and reduce the potential of erosion from sootblowers.
10	HRSG	Increase HRSG Tube Corrosion Allowance	Tubes with a higher minimum wall thicknes (i.e. higher corrosion allowance) were installed in specific areas of the HRSGs that were identified due to tube thickness history and UT data.	Began in 2012, ongoing	Improve HRSG reliability, increase the useful life of HRSG tubes and reduce the potential for tube failures in between HRSG outages.
11	HRSG	Upgraded Tube Metallurgy in HRSGs	Overlayed tubes and tubes with upgraded metallurgy were installed in certain areas of the HRSGs most prone to tube failures.	Began in 2012, ongoing	Improve HRSG reliability by decreasing the potential for tube erosion and failure caused by sootblowers.
12	HRSG	Upgraded Metallurgy on HRSG Baffles	Thicker baffle plates, made of solid Inconel material were installed in the HRSGs.	Annually	Improve HRSG reliability by prolonging the life of the HRSG baffles.
13	HRSG	New Isolation Valve Added to HRSGs	Double block (isolation) valve added to all HRSGs—check valve was prone to plugging, new double block valve and phosphate line added to decrease HRSG downtime.	2010	Improve HRSG water chemistry reliability.
14	BVS	Bypass Vent Stack Structural Upgrades	Structural upgrades done on bypass vent stack to lengthen life of stack.	2014	Improve reliability and asset life of bypass vent stacks.
15	HRSG/FGD	Climate Control Added to MCC Buildings	Electrical upgrades completed to Motor Control Center (MCC) building (positive pressure upgrades) and control room AC system.	2011	Improve reliability of plant electrical system by reducing degradation to electrical equipment from material buildup.
16	HRSG/FGD	Electrical Reliability Improvements	Electrical reliability study in progress.	2015 and forward	Improve reliability of the plant electrical system.

Gateway Energy and Coke Company - Reliability Studies List (pursuant to CD Paragraphs 38-40)

#	Type	Project Title	Project Description	Date Implemented	Reasons Implemented
17	FGD	Addition of Dew-point Analyzers	Installed dew-point transmitters on the SDA and changed operation of SDA into dewpoint control instead of SDA outlet temperature control.	Dew-point transmitters installed 2011 Redundant Dew-point Transmitters installed 2012	Improve FGD reliability by reducing the potential for FGD downtime due to slurry and acid gas deposition.
18	FGD	Redundant Pressure Transmitters on FGD Baghouse	Installation redundant pressure transmitters for the inlet and outlet to the baghouse.	2012	Improve operational reliability of the FGD baghouse.
19	FGD	Increased the Number of Spare Atomizers	Increased number of spare atomizers available for additional maintenance redundancy.	2011	Improve FGD reliability.
20	FGD	Atomizer Maintenance Best Practices	Established improved standard operating procedure (SOP) for atomizer cleaning to ensure atomizer reliability.	2010, continuously revise as necessary	Improve SDA atomizer reliability.
21	FGD	Atomizer Well Changes	Lowered the atomizer well support tube to increase the distance from the swirl vanes.	2011	Improve SDA atomizer reliability.
22	FGD	Atomizers for Reduced Load Conditions	Selective use of atomizers for reduced load conditions.	Ongoing	Improve FGD reliability and reduce FGD downtime to facilitate compliance with the CD emission limits.
23	FGD	SDA Thermocouple Chain	Test and install SDA thermocouple chain.	In Progress	Improve FGD reliability and reduce FGD downtime to facilitate compliance with the CD emission limits.
24	FGD	Instrumentation at Atomizer Gas Inlets	Add instrumentation at atomizer gas inlets to monitor balance.	In Progress	Improve FGD reliability and reduce FGD downtime to facilitate compliance with the CD emission limits.
25	FGD	ID Fan Turning Vane Replacement	Replaced the turning vanes in the ID Fans utilizing heavier gauge metal throughout and stiffened the top and bottom vane supports.	2012-2014	Improve ID fan reliability.
26	FGD	SDA Cone Replacement	Replace lower portion of existing cone with stainless steel.	Planning to complete in 2016 or 2018	Improve FGD reliability and reduce FGD downtime to facilitate compliance with the CD emission limits.
27	FGD	SDA Mechanical Integrity Inspection Program	Implemented internal and external SDA inspection program to identify areas of corrosion and monitor wall thickness. Information used in gas sharing design (max vessel pressure) and also used to evaluate life of asset and necessary repairs/upgrades.	2013-2014	Improve reliability of the SDA.
28	FGD	SDA Roof Insulation Upgrades	Redesigned and replaced the SDA roof insulation.	2013	Improve SDA reliability and reduce the potential for under-deposit corrosion by improving drainage.
29	FGD	Lime Slaker Improvements	Installed new mechanical seals and new shaft to prevent slurry leakages which had previously caused slaker downtime. Rerouted the floor drain to ensure proper drainage.	2012 (drain) 2013 (seal, bearings, shaft)	Improve SDA and atomizer reliability and reduce the potential for slurry leakage and backflow to shaft.
30	FGD	Hydrated PAC System Installation	Completed upgrades to original activated carbon injection (PAC) system including redundant feed system. Original PAC system was causing FGD reliability and SO2 scrubbing issues, so testing was completed and a hydrated carbon injection system (HAC) was installed.	In Progress	Hydrated PAC (HAC) system will increase mercury control efficiency and SDA reliability by installing a system that was compatible with SDA operation.
31	HRSR	New Actuator on HRSR PCV	Installed new actuator for the control of the pressure control valve (PCV) on the HRSR.	2010	Improve HRSR reliability.
32	HRSR	HRSR Maintenance Platforms	Added platforms in designated areas on all HRSRs for faster, more efficient maintenance.	2011	Improve HRSR reliability and allow for better, more efficient maintenance access.

Gateway Energy and Coke Company - Reliability Studies List (pursuant to CD Paragraphs 38-40)

#	Type	Project Title	Project Description	Date Implemented	Reasons Implemented
33	HRSG/FGD	Compressed Air Tie-ins for Backup Air Supplies	Installed tie-in/taps into strategic points in the plant air and instrument air systems so that one system can be used as a backup for the other, or portable air compressors can be tied in in the event of a problem with compressed air supplies.	2011	Improve plant reliability and minimize equipment downtime by adding backup compressed air system.
34	HRSG	Winterization Procedures	Winterization of HRSGs is completed on an annual basis to ensure continued operation in cold weather. This includes checking heat tracing of lines and insulation of HRSGs.	Ongoing	Improve HRSG reliability and reduce the potential for HRSG issues during winter months.
35	FGD	Upgraded SDA Dilution Water System	Upgraded the dilution water system to increase the capability of dilution water supply by installing bigger pumps and larger piping. Upgraded the underground pipe to accommodate the increase in pressure.	2014	Increase reliability of SDA dilution water system.
36	HRSG	Upgraded Refractory Anchors	Upgraded the refractory anchor installation practices on the inlet ducts to the HRSGs.	Began in 2011, ongoing	Improve HRSG reliability by preventing/reducing refractory loss inside the units.
37	FGD	ID Fan Coating for Plant Startup	Installed coating on ID fans at startup to protect the metal from dew-point corrosion that can be caused by cold water startup of HRGs. (This was a short term project for startup only; did not re-apply due to the availability of heated boiler feedwater.)	2009 at startup	Reduce potential for ID fan damage from corrosion and improved ID fan reliability.
38	FGD	SDA Online Cleaning and Inspection Ports	Installed ports in the SDA that were used for online inspections and online cleaning using an air lance. Cleanup was discontinued when dew point controlled was installed.	2010	Improve SDA reliability by allowing for online inspections and removal of wall buildup.
39	HRSG	Installation of Retractable Sootblowers	Replace the original rotary sootblowers on the HRSGs with a new retractable type sootblower.	2015	Improve HRSG reliability by improving tube cleaning efficiency of sootblowing.
40	HRSG	Air In-leakage repairs	Installation of overlapping vent stack lids on bypass vent stacks.	Planning to complete in 2015 or 2016	Reduce air in-leakage through bypass vent stacks and increase draft for gas sharing.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

ATTACHMENT G – OUTAGE WORK SCOPE ADDITION APPROVAL

1. PURPOSE

The purpose is to document, approve, and manage “add-on” jobs (jobs requested to be completed after the “freeze date” of a give shutdown). % Add on (number and total hours) will be tracked for each shut down.

2. PROCESS

1. Complete this form.
2. Review & Gain approval and signature of the Operations & Maintenance Managers (GM and Environmental Manager when required)
3. Shutdown Scheduler will add job to S/D list.
4. Shutdown Scheduler will keep a copy for records and track (as a metric) for the shutdown performance.

Originator	
Date of Request	
Work Order Number	
Scope/Description of Job	
Estimated Cost (\$)	
Resource Impact (<i>briefly summarize resources to complete including ops and crafts</i>)	
Duration:	<i>Will the impact the current critical path or shutdown duration?</i> <input type="checkbox"/> Yes (If yes, review and approval by GM and Environmental required). <input type="checkbox"/> No
Type of Change <i>(New Job or Change of Scope on existing job)</i>	
Justification:	
Reason for Adding Job after “Freeze Date”:	
MOC Required? Y/N	
MOC Completed by: (Name and Date)	
APPROVALS:	
Operations Manager	
Maintenance Manager	
If “add on” work has the potential to extend the overall outage duration the additional approvals are required:	
General Manager	
Environmental Manager	

FORWARD APPROVED “ADD ON” TO SHUTDOWN SCHEDULER.

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

ATTACHMENT H – PMO PLAN DOCUMENT CONTROL FORM

- *To be completed every time the PMO Plan is revised*
- *Provide reference to section(s) that have been revised under “Details of Revision”*

Issue	Date	Authorized	Details of Revision

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

ATTACHMENT I – COPY OF CONSENT DECREE PARAGRAPH 17

Gateway Energy and Coke Company
Preventive Maintenance and Operation Plan

17. Beginning on the earlier of (a) the date Defendants notify Plaintiffs that the redundant HRSGs at HNCC No. 2, HNCC No. 1, and the GECC Battery, respectively, are fully operational or (b) twenty-seven (27) months after the Effective Date at HNCC No. 2 and fifty-one (51) months after the Effective Date at HNCC No. 1 and the GECC Battery, Defendants shall comply with the Bypass Venting emission limits⁵ specified in the table below at each Affected Coke Oven Battery:

Pollutant	Each Bypass Vent Stack (pounds/hour)			Main Stack Bypass Venting (pounds/hour)			Total Bypass Venting (tons/year ^b)		
	HNCC No. 1	HNCC No. 2	GECC	HNCC No. 1	HNCC No. 2	GECC	HNCC No. 1	HNCC No. 2	GECC
SO ₂	323 ^c	323 ^c	323 ^c	1615 ^c	1615 ^c	1938 ^c	271.3	271.3	325.6
	420 ^d	420 ^d	--	2100 ^d	2100 ^d	--			
PM	34.3 ^a	34.3 ^a	34.3 ^a	171.5 ^a	171.5 ^a	205.8 ^a	28.8	28.8	34.6
Pb	---	---	0.186 ^a	---	---	1.116 ^a	---	---	0.188

Table Notes:

- a. Compliance shall be determined in accordance with Section IV.F (Quantification of Emissions During Bypass Venting). The emissions limits relating to PM include both filterable and condensable emissions.
- b. Rolling 24-month total.
- c. For any Bypass Venting Incident lasting 48 consecutive hours or longer, compliance shall be determined as a rolling 48-hour average, for each such Bypass Venting Incident. For any Bypass Venting Incident lasting less than 48 consecutive hours, this limit shall not apply.
- d. Based on a 3-hour block average.

⁵ Nothing in Paragraph 17 of this Consent Decree shall eliminate Defendants' obligations to comply with the existing requirements of Defendants' relevant permits